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L1: Entry 1 of 2 File: JPAB Mar 30, 1993

PUB-NO: JP405077608A
DOCUMENT-IDENTIFIER: JP 05077608 A
TITLE: PNEUMATIC TIRE FOR HEAVY LOAD

PUBN-DATE: March 30, 1993

INVENTOR-INFORMATION:

NAME	COUNTRY
TSUKAGOSHI, TETSUTO	

ASSIGNEE-INFORMATION:

NAME	COUNTRY
BRIDGESTONE CORP	

APPL-NO: JP03239919
APPL-DATE: September 19, 1991

US-CL-CURRENT: 152/209.12
INT-CL (IPC): B60C 11/00; B60C 11/06

ABSTRACT:

PURPOSE: To restrain biased abrasion and to drastically delay development of one side dropped abrasion.

CONSTITUTION: A pair of narrow grooves 16 is provided on a tread 12, a first circular arc part 12A is provided between a tread center CL and the narrow grooves 16 and a second circular arc part 12B is provided between the narrow grooves 16 and a tread edge part 12C. Consequently, a grounding shape 26 of a pneumatic radial tire 10 for heavy load at the time of loading comes to be gradually shorter in grounding length from the center in the tire cross direction toward both edge parts in the tire cross direction and comes to be longer in the grounding length in the circumferential direction toward the both edge parts in the tire cross direction again. Accordingly, drag at the tread edge part 12C is drastically reduced, biased abrasion is restrained and development of one side dropped abrasion is drastically delayed.

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L1: Entry 2 of 2 File: DWPI Mar 30, 1993

DERWENT-ACC-NO: 1993-140126
DERWENT-WEEK: 200102

TITLE: Heavy duty pneumatic tyre with improved resistivity to uneven wear, etc. - has tread profile before inflation composed of two circular arcs of differing radius connected at dented region

PATENT-ASSIGNEE:

ASSIGNEE	CODE
BRIDGESTONE CORP	BRID

PRIORITY-DATA: 1991JP-0239919 (September 19, 1991)

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 05077608 A	March 30, 1993		005	B60C011/00
JP 3121391 B2	December 25, 2000		005	B60C011/00

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
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INT-CL (IPC): B60C 11/00; B60C 11/04; B60C 11/06

ABSTRACTED-PUB-NO: JP 05077608A
BASIC-ABSTRACT:

Tyre has the tread profile before inflation composed of two circular arcs, i.e., the 1st circular arc of radius CR1 with the centre placed on the centre line CL under the tread and the second circular arc of radius CR2, which is larger than CR1, with the centre placed on the centre line CL under the tread, and they are connected at the point forming a dented region in the circumferential direction.

Specifically (a) the radii CR1 and CR2 range from 400-650 mm and from 800-2000 mm, respectively, (b) a narrow width circumferential groove is provided along the line passing through the intersection point, and (c) the intersection point is located in the tyre axis side with respect to the imaginary circular arc of radius CRO, passing the tread centre point and edge point with the centre on the centre line

CL, and the relevant radial distance t is 0.3-2.0 mm.

ADVANTAGE - When the tyre is subjected to the normal tyre pressure and the normal tyre load, the ground contacting length decreases from the centre line toward the dented region and then increases toward the contact edge, with the effect to reduce the uneven wear and the one-side-fall wear along the tread edge.

CHOSEN-DRAWING: Dwg.0/6

TITLE-TERMS: HEAVY DUTY PNEUMATIC TYRE IMPROVE RESISTOR UNEVEN WEAR TREAD PROFILE INFLATE COMPOSE TWO CIRCULAR ARC DIFFER RADIUS CONNECT DENT REGION

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

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審査請求　未請求　請求項の数４(全　５　頁)

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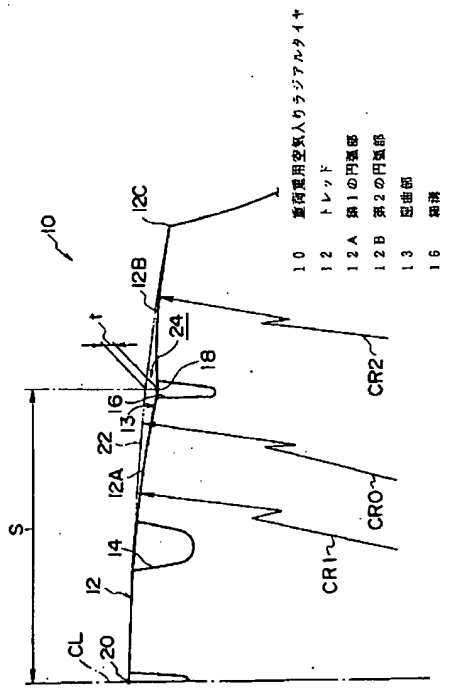
(54)【発明の名称】　重荷重用空気入りタイヤ

(57)【要約】
【目的】　偏摩耗を抑制すると共に片落ち摩耗の進展を大幅に遅らせる。
【構成】　トレッド１２に一対の細溝１６を設け、トレッドセンターＣＬから細溝１６までの間に第１の円弧部１２Ａを設け、細溝１６からトレッド端部１２Ｃまでの間に第２の円弧部１２Ｂを設ける。これによって重荷重用空気入りラジアルタイヤ１０の負荷時の接地形状２６は、タイヤ幅方向中央からタイヤ幅方向両端部にかけて接地長が徐々に短くなり、再びタイヤ幅方向両端部にかけて周方向接地長さが長くなる。このため、トレッド端部での引きずりが大幅に減少し、偏摩耗が抑制されると共に片落ち摩耗の進展が大幅に遅れる。



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【特許請求の範囲】

【請求項１】　トレッド中央部に設けられ内圧未充填時においてタイヤ軸心側に曲率中心を持つ曲率半径がＲ１とされた第１の円弧部と、前記第１の円弧部のタイヤ幅方向両側に設けられ内圧未充填時において前記曲率半径Ｒ１よりも大なる曲率半径がＲ２とされた第２の円弧部と、を備え、前記第１の円弧部と前記第２の円弧部とをタイヤ軸心側に凹とされた屈曲部を介して接続したことを特徴とする重荷重用空気入りタイヤ。

【請求項２】　前記第１の円弧部の曲率半径Ｒ１を４００～６５０㎜の範囲に設定し、前記第２の円弧部の曲率半径Ｒ２を８００～２０００㎜の範囲に設定したことを特徴とする請求項１記載の重荷重用空気入りタイヤ。

【請求項３】　前記トレッドの前記屈曲部に周方向に延びる細溝を設けたことを特徴とする請求項１または請求項２記載の重荷重用空気入りタイヤ。

【請求項４】　前記第１の円弧部と前記第２の円弧部との交点は、トレッドセンター及びトレッド端部を通りトレッドセンターのタイヤ軸心側に曲率中心を持つ仮想円弧に対してタイヤ軸心側に位置し、前記交点から前記仮想円弧までのタイヤ半径方向の距離を０．３～２．０㎜の範囲とした請求項１、請求項２または請求項３記載の重荷重用空気入りタイヤ。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、重荷重用空気入りタイヤに係り、特にサイドフォースの強くかかる走行に使用される重荷重用空気入りタイヤに関する。

【０００２】

【従来の技術】従来、図４に示すように、トレッドの外形が単一の曲率（曲率半径ＣＲ０）とされた重荷重用空気入りタイヤ５０が提案されているが、図５に示すように、接地形状５２において、タイヤ幅方向（図５矢印Ｗ方向）両端部でタイヤ周方向（図５矢印Ｃ方向）接地長さが短いため偏摩耗が起こりやすいという不具合があった。この不具合を解消するため、トレッドの外形が曲率半径の異なる２つの曲率から構成される所謂ダブルクラウン化された重荷重用空気入りタイヤが提案されている。このダブルクラウン化された重荷重用空気入りタイヤにおいて、図６に示すように、タイヤ中央部の円弧部６２（曲率半径はＣＲ１）とタイヤ幅方向両端部側の円弧部６４（曲率半径はＣＲ２、ただしＣＲ２＞ＣＲ１）とが連続して滑らかに接する重荷重用空気入りタイヤ６０が提案されている。

【０００３】この重荷重用空気入りタイヤ６０は、直進走行が多く、サイドフォースの作用する機会が少ない市場等では、引きずりによる偏摩耗が抑制されて有効であるが、反面、サイドフォースの作用する走行が多い市場では、トレッド端部６６のエッジが丸まった後、それがセンターラインＣＬ側に進展する片落ち摩耗が発生するという不具合がある。

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【０００４】

【発明が解決しようとする課題】本発明は上記事実を考慮し、偏摩耗を抑制すると共に片落ち摩耗の進展を大幅に遅らせることのできる重荷重用空気入りタイヤを提供することが目的である。

【０００５】

【課題を解決するための手段】請求項１記載の発明の重荷重用空気入りタイヤは、トレッド中央部に設けられ内圧未充填時においてタイヤ軸心側に曲率中心を持つ曲率半径がＲ１とされた第１の円弧部と、前記第１の円弧部のタイヤ幅方向両側に設けられ内圧未充填時において前記第１の円弧部の曲率半径よりも大なる曲率半径がＲ２とされた第２の円弧部と、を備え、前記第１の円弧部と前記第２の円弧部とをタイヤ軸心側に凹とされた屈曲部を介して接続したことを特徴としている。

【０００６】請求項２記載の発明は、請求項１記載の重荷重用空気入りタイヤにおいて、前記第１の円弧部の曲率半径Ｒ１を４００～６５０㎜の範囲に設定し、前記第２の円弧部の曲率半径Ｒ２を８００～２０００㎜の範囲に設定したことを特徴としている。

【０００７】請求項３の発明は、請求項１または請求項２記載の重荷重用空気入りタイヤにおいて、前記トレッドの前記屈曲部に周方向に延びる細溝を設けたことを特徴としている。

【０００８】請求項４の発明は、請求項１、請求項２または請求項３記載の重荷重用空気入りタイヤにおいて、前記第１の円弧部と前記第２の円弧部との交点は、トレッドセンター及びトレッド端部を通りトレッドセンターのタイヤ軸心側に曲率中心を持つ仮想円弧に対してタイヤ軸心側に位置し、前記交点から前記仮想円弧までのタイヤ半径方向の距離を０．３～２．０㎜の範囲としたことを特徴としている。

【０００９】

【作用】請求項１記載の発明によれば、重荷重用空気入りタイヤは内圧未充填時において、トレッド中央部がタイヤ軸心側に曲率中心を持つ曲率半径がＲ１とされた第１の円弧部とされ、第１の円弧部のタイヤ幅方向両側が第１の円弧部の曲率半径よりも大なる曲率半径がＲ２とされた第２の円弧部とされており、第１の円弧部と第２の円弧部とがタイヤ軸心側に凹とされた屈曲部を介して接続されている。したがって、この重荷重用空気入りタイヤの接地形状は、タイヤ幅方向中央部から屈曲部にかけて一旦接地長さが短くなり、屈曲部からトレッド端部にかけて徐々に接地長さが長くなる。これによって、サイドフォースの作用する屈曲部からトレッド端部にかけての引きずりによる偏摩耗を一層効果的に抑制しつつ、トレッド端部が丸まり、片落ち摩耗が進展する時間を大幅に遅くすることができる。したがって、サイドフォースの作用する走行が多い市場において、タイヤ寿命を延

ばすことができる。

【0010】請求項2記載の発明によれば、第1の円弧部の曲率半径R1を400～650㎜の範囲に設定し、第2の円弧部の曲率半径R2を800～2000㎜の範囲に設定したため、接地形状は、タイヤ幅方向中央部から屈曲部にかけて接地長さを短くして、屈曲部からトレッド端部にかけて徐々に接地長さを長くすることができる。ここで、第1の円弧部の曲率半径R1が400㎜未満の場合には、屈曲部における接地長さが短くなり過ぎて、屈曲部近傍で偏摩耗が発生するため好ましくなく、650㎜を超える場合には、屈曲部の深さが浅くなり片落ち摩耗が進展する時間を遅くすることができない。また、第2の円弧部の曲率半径R2が800㎜未満の場合には、屈曲部の深さが浅くなり片落ち摩耗が進展する時間を遅くすることができず、2000㎜を超える場合には、偏摩耗が発生するため好ましくない。

【0011】請求項3記載の発明によれば、トレッドの屈曲部に周方向に延びる細溝が設けられているため、この細溝によってタイヤ幅方向内側への片落ち摩耗の進展を抑制することができる。したがって、サイドフォースの作用する走行が多い市場において、さらにタイヤの寿命を延ばすことができる。

【0012】請求項4記載の発明によれば、第1の円弧部と第2の円弧部との交点が、トレッドセンター及びトレッド端部を通りトレッドセンターのタイヤ軸心側に曲率中心を持つ仮想円弧に対してタイヤ軸心側に位置され、交点から前記仮想円弧までのタイヤ半径方向の距離が0．3～2．0㎜の範囲とされている。したがって、屈曲部の引きずりによる偏摩耗発生を防止しつつ、トレッド端部の接地長さを長くして片落ち摩耗を一層効果的に防止する。なお、交点から前記仮想円弧までのタイヤ半径方向の距離は、0．3㎜未満ではトレッド端部の片落ち摩耗に効果的でなく、2．0㎜を越えると屈曲部の接地長さが短くなりすぎて、屈曲部で引きずり摩耗を起こしてしまう。

【0013】

【実施例】以下本発明の一実施例を図1乃至図3にしたがって説明する。

【0014】図2に示すように、重荷重用空気入りラジアルタイヤ10のトレッド12には、トレッドセンターCLのタイヤ幅方向（図2矢印W方向）両側にタイヤ周方向（図2矢印C方向）に沿って延びる一対の主溝14が設けられている。また、トレッド12には、これらの主溝14のタイヤ幅方向外側に周方向に沿って延びる一対の細溝16が夫々トレッドセンターCLから所定寸法S離されて設けられている。

【0015】図1に示すように、トレッド12は、トレッドセンターCLから細溝16までの間が第1の円弧部12Aとされており、この第1の円弧部12Aはタイヤ軸心側のトレッドセンターCL上に曲率中心を持ち、その曲率半径CR1は内圧未充填時において400～650㎜とされている。また、トレッド12は、細溝16からトレッド端部12Cまでの間が第2の円弧部12Bとされており、この第2の円弧部12Bはタイヤ軸心側のトレッドセンターCL上に曲率中心を持ち、その曲率半径CR2は内圧未充填時において800～2000㎜とされている。

【0016】したがって、第1の円弧部12Aと第2の円弧部12Bとの交点18は、タイヤ軸側のトレッドセンターCL上に曲率中心を持ちトレッド12の輪郭がトレッドセンターに交差する交点20とトレッド端部12Cとを通るトレッド12の輪郭よりもタイヤ軸側へ入り込まない最大の単一曲率を有する仮想円弧22からタイヤ半径方向内側へ入り込んだ位置とされる。すなわち、トレッド12の交点18近傍には、第1の円弧部12Aと第2の円弧部12Bとによって屈曲部13が形成され、第1の円弧部12A、第2の円弧部12B及び仮想円弧22との間には、断面略3角形状の隙間部24が形成される。

【0017】ここで、内圧が充填された重荷重用空気入りラジアルタイヤ10の負荷時の接地形状26は、図3に示すように、タイヤ幅方向（図3矢印W方向）中央からタイヤ幅方向両端側にかけて周方向（図3矢印C方向）接地長が一旦短くなり、その後再びタイヤ幅方向両端部にかけて周方向接地長さが長くなる。このように、本発明の重荷重用空気入りラジアルタイヤ10は、接地形状26において、タイヤ幅方向両端部、すなわちトレッド端部で周方向接地長が長くなるため、トレッド端部での引きずりが大幅に減少し、偏摩耗の発生を遅らせることによって偏摩耗の発生までの時間を遅らせることができる。また、交点18部分に細溝16を設けたことによって片落ち摩耗の進展が細溝16部分で食い止められ、タイヤ幅方向内側への片落ち摩耗の進展をさらに遅らせることができる。

【0018】なお、第1の円弧部12Aの曲率半径CR1を400～650㎜の範囲に設定したのは、曲率半径CR1が400㎜未満では細溝16近傍で接地長が短くなりすぎて細溝16の近傍で偏摩耗が発生するため好ましくなく、曲率半径CR1が650㎜より大きいとトレッド12の中央部が平坦になり過ぎ、隙間24が小さくなるため、片落ち摩耗の進展防止効果が少なく好ましくない。

【0019】一方、曲率半径CR2を800～2000㎜の範囲に設定したのは、曲率半径CR2が800㎜未満では、細溝16近傍で接地長が短くなりすぎて細溝16の近傍で偏摩耗が発生するため好ましくなく、曲率半径CR2が2000㎜より大きいと、偏摩耗が発生するため好ましくない。

【0020】なお、この隙間24において、交点18から仮想円弧22までのタイヤ半径方向の寸法tは0．3

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～2．0㎜の範囲とされ、好ましくは0．7～1．0㎜の範囲とされている。

【0021】また、前記細溝16は、タイヤ新品時における開口部の幅寸法Wが1．5～4．0㎜とされており、深さ寸法Dが12～16㎜とされている。なお、細溝16は、幅寸法Wが1．5㎜及び深さ寸法Dが12㎜未満では、片落ち摩耗の進展を遅らせる効果が少なく、幅寸法Wが4㎜及び深さ寸法Dが16㎜を超える場合には、トレッド12の剛性が細溝16近傍で低下するため望ましくない。

【0022】なお、本発明は、重荷重用空気入りラジアルタイヤに適用するのみならず、バイアスタイヤ等の他の構造のタイヤに適用してもよいのは勿論である。

（試験例）以下の表1には従来品重荷重用空気入りラジアルタイヤ（図4に示すシングルRの重荷重用空気入り＊ラジアルタイヤ50及び図6に示すダブルクラウン化された重荷重用空気入りラジアルタイヤ60）と、本発明の重荷重用空気入りラジアルタイヤ10に夫々規定内圧を充填して実車の前輪へ装着して、この実車を定積載状態で80000Km走行させた後のトレッド端部の摩耗量を測定した結果が指数で示されている。なお、表1の従来品1とは図4に示すシングルRの重荷重用空気入りラジアルタイヤ50のことであり、従来品2とはダブルクラウン化された重荷重用空気入りラジアルタイヤ60のことである。また、測定値は従来のシングルRの重荷重用空気入りラジアルタイヤ50を100としており、数値が小さいほど良となっている。

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【0023】

【表1】

	従来品1	従来品2	本実施例品1	本実施例品2
CR0（㎜）	730	———	730	640
CRI（㎜）	———	600	600	500
CR2（㎜）	———	1000	1000	1000
t（㎜）	———	———	0．7	0．8
S（㎜）	———	———	72	60
トレッド端部摩耗量：指数	100	64	31	33

上記試験結果からも、本発明の重荷重用空気入りラジアルタイヤ10が従来品に比較してトレッド端部での偏摩耗防止効果が高く、これによって偏摩耗発生までの時間を遅らせることができることが明らかとなっている。

【0024】

【発明の効果】本発明の重荷重用空気入りタイヤは上記構成としたので、偏摩耗を抑制すると共に片落ち摩耗の進展を大幅に遅らせることのできる優れた効果を有する。

【図面の簡単な説明】

【図1】本発明の一実施例にかかる重荷重用空気入りラジアルタイヤのトレッドを示す断面図である。

【図2】本発明の一実施例にかかる重荷重用空気入りラジアルタイヤのトレッドを示す平面図である。

【図3】本発明の一実施例にかかる重荷重用空気入りラ※ジアルタイヤの接地形状である。

【図4】従来例の単一曲率の重荷重用空気入りタイヤを示す断面図である。

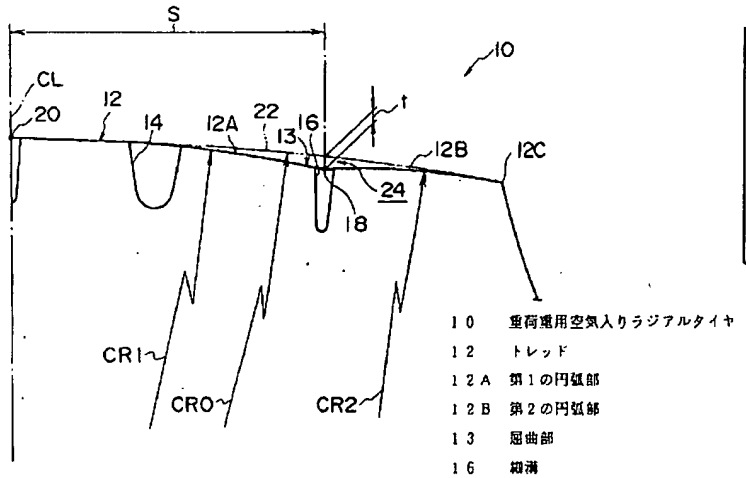
【図5】従来例の単一曲率の重荷重用空気入りタイヤの接地形状である。

【図6】従来例のダブルクラウン化された重荷重用空気入りタイヤを示す断面図である。

【符号の説明】

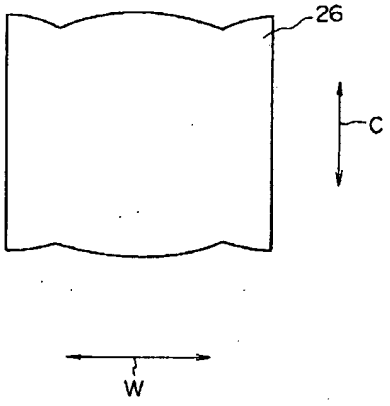
10　重荷重用空気入りラジアルタイヤ
12　トレッド
12A　第1の円弧部
12B　第2の円弧部
13　屈曲部
16　細溝
18　交点

【図1】

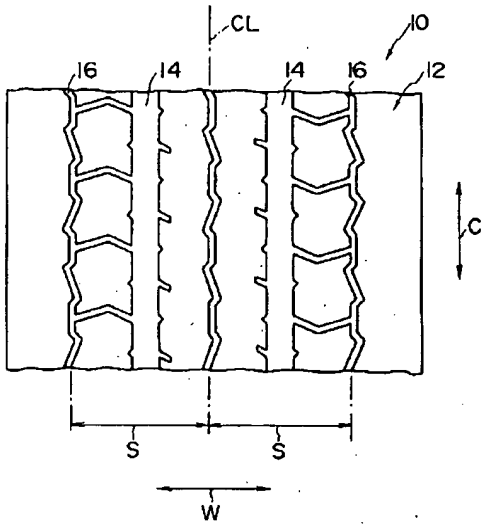


10　重荷重用空気入りラジアルタイヤ
12　トレッド
12A　第1の円弧部
12B　第2の円弧部
13　屈曲部
16　細溝

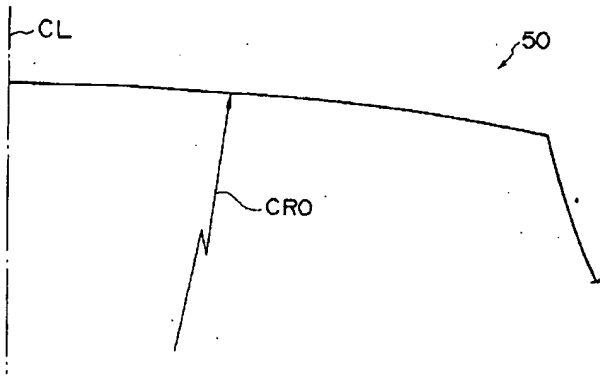
【図3】



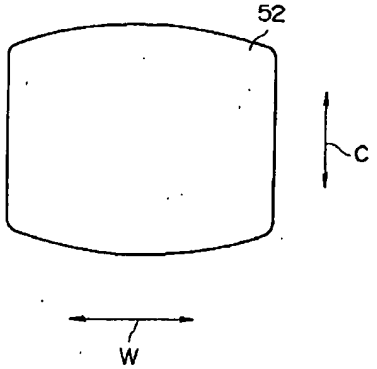
【図2】



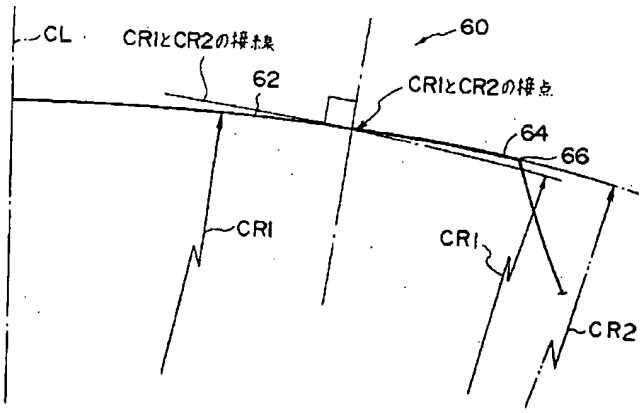
【図4】



【図5】



【図6】



* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the pneumatic tire for heavy loading strong [side] and used [apply to the pneumatic tire for heavy loading, especially] for this transit.
[0002]
[Description of the Prior Art] As conventionally shown in drawing 4 , the pneumatic tire 50 for heavy loading with which the appearance of a tread was made into single curvature (radius of curvature CR 0) was proposed, but as shown in drawing 5 , in the touch-down configuration 52, there was fault that partial wear tends to happen at tire cross direction (direction of drawing 5 arrow-head W) both ends since tire hoop direction (direction of drawing 5 arrow-head C) touch-down length is short. In order to cancel this fault, the double-crown-ized so-called pneumatic tire for heavy loading with which the appearance of a tread consists of two curvatures from which radius of curvature differs is proposed. In this double-crown-ized pneumatic tire for heavy loading, as shown in drawing 6 , the pneumatic tire 60 for heavy loading with which the radii section 62 (radius of curvature is CR1) of a tire center section and the radii section 64 (radius of curvature is CR [2], however CR2>CR1) by the side of tire cross direction both ends touch smoothly continuously is proposed.
[0003] In a commercial scene with much [this pneumatic tire 60 for heavy loading has much rectilinear-propagation transit, and / although the partial wear by drag is controlled and it is effective in a commercial scene with few opportunities for a side force to act] transit on which a side force acts on the other hand, after the edge of the tread edge 66 is round, there is fault that the piece omission wear by which it progresses to a center line CL side occurs.
[0004]
[Problem(s) to be Solved by the Invention] While this invention controls partial wear in consideration of the above-mentioned fact, it is the purpose to offer the pneumatic tire for heavy loading which can delay progress of piece omission wear sharply.
[0005]
[Means for Solving the Problem] The pneumatic tire for heavy loading of invention according to claim 1 The 1st radii section by which the radius of curvature which is prepared in a tread center section and has center of curvature in a tire axial center side at the time of internal pressure non-filling was set to R1, It is prepared in the tire cross direction both sides of said 1st radii section, and sets at the time of internal pressure non-filling. Size rather than the radius of curvature of said 1st radii section The 2nd radii section by which the becoming radius of curvature was set to R2, It is characterized by connecting a preparation, said 1st radii section, and said 2nd radii section to a tire axial center side through the flection made into concave.
[0006] Invention according to claim 2 is characterized by having set the radius of curvature R1 of said 1st radii section as the range of 400-650mm, and setting the radius of curvature R2 of said 2nd radii section as the range of 800-2000mm in the pneumatic tire for heavy loading according to claim 1.
[0007] Invention of claim 3 is characterized by preparing the rill prolonged in said flection of said tread

in a hoop direction in the pneumatic tire for heavy loading according to claim 1 or 2.
[0008] Invention of claim 4 is set to claim 1 and the pneumatic tire for heavy loading according to claim 2 or 3. The intersection of said 1st radii section and said 2nd radii section It is located in a tire axial center side to the virtual radii which have center of curvature in the tire axial center side of a tread pin center,large through a tread pin center,large and a tread edge, and is characterized by making distance tire radial [from said intersection to said virtual radii] into the range of 0.3-2.0mm.
[0009]
[Function] According to invention according to claim 1, the pneumatic tire for heavy loading is set at the time of internal pressure non-filling. The radius of curvature to which a tread center section has center of curvature in a tire axial center side is made into the 1st radii section set to R1. The radius of curvature which the tire cross direction both sides of the 1st radii section become from the radius of curvature of the 1st radii section size is made into the 2nd radii section set to R2, and the 1st radii section and the 2nd radii section are connected to the tire axial center side through the flection made into concave. Therefore, the touch-down configuration of this pneumatic tire for heavy loading is applied to a flection from a tire cross direction center section, once touch-down length becomes short, is missing from a tread edge from a flection, and touch-down length becomes long gradually. Controlling much more effectively the partial wear by the drag applied to a tread edge by this from the flection on which a side force acts, a tread edge can be round and time amount to which piece omission wear progresses can be sharply made late. Therefore, a tire life can be prolonged in a commercial scene with much transit on which a side force acts.
[0010] Since according to invention according to claim 2 the radius of curvature R1 of the 1st radii section was set as the range of 400-650mm and the radius of curvature R2 of the 2nd radii section was set as the range of 800-2000mm, it can lengthen touch-down length gradually, it being able to shorten touch-down length and being able to apply [apply a touch-down configuration to a flection from a tire cross direction center section, and] it to a tread edge from a flection. Here, since the touch-down length in a flection becomes short too much and partial wear occurs near the flection, when the radius of curvature R1 of the 1st radii section is less than 400mm, when exceeding 650mm preferably, the depth of a flection cannot become shallow and time amount to which piece omission wear progresses cannot be made late. Moreover, when the depth of a flection cannot become shallow and time amount to which piece omission wear progresses cannot be made late, when the radius of curvature R2 of the 2nd radii section is less than 800mm, but exceeding 2000mm, since partial wear occurs, it is not desirable.
[0011] Since the rill prolonged in the flection of a tread in a hoop direction is prepared according to invention according to claim 3, progress of the piece omission wear to the tire cross direction inside can be controlled by this rill. Therefore, in a commercial scene with much transit on which a side force acts, the life of a tire can be prolonged further.
[0012] According to invention according to claim 4, it is located in a tire axial center side to the virtual radii to which the intersection of the 1st radii section and the 2nd radii section has center of curvature in the tire axial center side of a tread pin center,large through a tread pin center,large and a tread edge, and considers as the range whose distance tire radial [from an intersection to said virtual radii] is 0.3-2.0mm. Therefore, preventing partial wear generating by the drag of a flection, the touch-down length of a tread edge is lengthened and piece omission wear is prevented much more effectively. In addition, if a distance tire radial [from an intersection to said virtual radii] is not effective for piece omission wear of a tread edge and exceeds 2.0mm in less than 0.3mm, the touch-down length of a flection will become short too much, will drag by the flection, and will cause wear.
[0013]
[Example] One example of this invention is explained according to drawing 1 thru/or drawing 3 below.
[0014] As shown in drawing 2 , the major groove 14 of the pair prolonged along a tire hoop direction (the direction of drawing 2 arrow-head C) on tire cross direction (direction of drawing 2 arrow-head W) both sides of the tread pin center,large CL is formed in the tread 12 of the radial-ply tire 10 containing air for heavy loading. Moreover, the rill 16 of the pair prolonged along a hoop direction is predetermined dimension S Separated from the tread pin center,large CL by the tread 12, respectively,

and is prepared in the tire cross direction outside of these major grooves 14 at it.
[0015] As shown in drawing 1 , the between from the tread pin center,large CL to a rill 16 is set to 1st radii section 12A, this 1st radii section 12A has center of curvature on the tread pin center,large CL by the side of a tire axial center, and that radius of curvature CR 1 is set to 400-650mm for the tread 12 at the time of internal pressure non-filling. Moreover, the between from a rill 16 to tread edge 12C is set to 2nd radii section 12B, this 2nd radii section 12B has center of curvature on the tread pin center,large CL by the side of a tire axial center, and that radius of curvature CR 2 is set to 800-2000mm for the tread 12 at the time of internal pressure non-filling.
[0016] Therefore, let the intersection 18 of 1st radii section 12A and 2nd radii section 12B be the location entered to the tire radial inside from the virtual radii 22 which have the greatest single curvature which does not enter to a tire shaft side rather than the profile of the tread 12 which passes along the intersection 20 when it has center of curvature at on the tread pin center,large CL by the side of a tire shaft, and the profile of a tread 12 intersects a tread pin center,large, and tread edge 12C. That is, a flection 13 is formed of 1st radii section 12A and 2nd radii section 12B, and the cross-section abbreviation 3 square-shape-like clearance section 24 is formed of them at about 18 intersection of a tread 12 between 1st radii section 12A, 2nd radii section 12B, and the virtual radii 22.
[0017] Here, as the touch-down configuration 26 at the time of the load of the radial-ply tire 10 containing air for heavy loading with which it filled up with internal pressure is shown in drawing 3 , it applies to a tire cross direction both-ends side from the center of the tire cross direction (the direction of drawing 3 arrow-head W), and hoop direction (direction of drawing 3 arrow-head C) touch-down length once becomes short, applies to tire cross direction both ends again after that, and hoop direction touch-down length becomes long. Thus, in the touch-down configuration 26, since hoop direction touch-down length becomes long in tire cross direction both ends, i.e., a tread edge, the drag in a tread edge can decrease sharply and the radial-ply tire 10 containing air of this invention for heavy loading can delay the time amount to generating of partial wear by delaying generating of partial wear. Moreover, by having formed the rill 16 in intersection 18 part, progress of piece omission wear is stopped in rill 16 part, and can delay further progress of the piece omission wear to the tire cross direction inside.
[0018] In addition, since the center section of the tread 12 will become flat too much if radius of curvature CR 1 is larger than 650mm preferably since touch-down length becomes [radius of curvature CR 1] short too much by about 16 rill by less than 400mm and partial wear occurs near the rill 16, and a clearance 24 becomes small, having set the radius of curvature CR 1 of 1st radii section 12A as the range of 400-650mm does not have the desirable progress prevention effectiveness of piece omission wear few.
[0019] Since touch-down length becomes [radius of curvature CR 2] short too much by about 16 rill by less than 800mm and partial wear occurs near the rill 16, if radius of curvature CR 2 is larger than 2000mm preferably, since partial wear occurs, it is not desirable to, have set radius of curvature CR 2 as the range of 800-2000mm on the other hand.
[0020] In addition, in this clearance 24, the dimension t tire radial [from the intersection 18 to the virtual radii 22] is made into the range of 0.3-2.0mm, and let it preferably be the range of 0.7-1.0mm.
[0021] Moreover, the width method W of opening [rill / 16 / said] at the time of a tire new article is set to 1.5-4.0mm, and the depth dimension D is set to 12-16mm. In addition, a rill 16 has little effectiveness that 1.5mm and the depth dimension D delay [the width method W] progress of piece omission wear by less than 12mm, and when 4mm and the depth dimension D exceed [the width method W] 16mm, since the rigidity of a tread 12 falls by about 16 rill, it is not desirable.
[0022] In addition, this invention of it not only applying to the radial-ply tire containing air for heavy loading, but your applying to the tire of other structures, such as a bias tire, is natural.
In the following table 1, conventionally The radial-ply tire containing air for elegance heavy loading (double-crown-ized radial-ply tire 60 containing air for heavy loading which is shown in the radial-ply tire 50 containing air for heavy loading and drawing 6 of Single R which are shown in drawing 4), (Example of a trial) The radial-ply tire 10 containing air of this invention for heavy loading is filled up with convention internal pressure, respectively, the front wheel of a real vehicle is equipped, and the

result of having measured the abrasion loss of the tread edge after making it running this real vehicle 80000km in the state of constant loading is shown by the characteristic. In addition, it is the thing of the radial-ply tire 50 containing air of Single R for heavy loading indicated to be the conventional article 1 of Table 1 to drawing 4 , and is the thing of the double-crown-ized radial-ply tire 60 containing air for heavy loading in elegance 2 conventionally. Moreover, measured value is setting the radial-ply tire 50 containing air of the conventional single R for heavy loading to 100, and it serves as good, so that a numeric value is small.

[0023]

[Table 1]

	従来品1	従来品2	本実施例品1	本実施例品2
CR0 (mm)	730	———	730	640
CRI (mm)	———	600	600	500
CR2 (mm)	———	1000	1000	1000
t (mm)	———	———	0.7	0.8
S (mm)	———	———	72	60
トレッド端部摩耗量：指数	100	64	31	33

As compared with elegance, the partial wear prevention effectiveness in a tread edge has the conventionally high radial-ply tire 10 containing air of this invention for heavy loading, and it is clear also from the above-mentioned test result that the time amount to partial wear generating is delayable with this.

[0024]

[Effect of the Invention] Since the pneumatic tire for heavy loading of this invention was considered as the above-mentioned configuration, while controlling partial wear, it has the outstanding effectiveness which can delay progress of piece omission wear sharply.

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1] The 1st radii section by which the radius of curvature which is prepared in a tread center section and has center of curvature in a tire axial center side at the time of internal pressure non-filling was set to R1, It is prepared in the tire cross direction both sides of said 1st radii section, and sets at the time of internal pressure non-filling. Size rather than said radius of curvature R1 The 2nd radii section by which the becoming radius of curvature was set to R2, A preparation, the pneumatic tire for heavy loading characterized by connecting said 1st radii section and said 2nd radii section to a tire axial center side through the flection made into concave.
[Claim 2] The pneumatic tire for heavy loading according to claim 1 characterized by having set the radius of curvature R1 of said 1st radii section as the range of 400-650mm, and setting the radius of curvature R2 of said 2nd radii section as the range of 800-2000mm.
[Claim 3] The pneumatic tire for heavy loading according to claim 1 or 2 characterized by preparing the rill prolonged in said flection of said tread in a hoop direction.
[Claim 4] The intersection of said 1st radii section and said 2nd radii section is claim 1 which was located in the tire axial center side to the virtual radii which have center of curvature in the tire axial center side of a tread pin center,large through a tread pin center,large and a tread edge, and made distance tire radial [from said intersection to said virtual radii] the range of 0.3-2.0mm, and a pneumatic tire for heavy loading according to claim 2 or 3.

[Translation done.]